MARINE REVIEW

VOL. XIX. Published every Thursday at 418-19 Perry-Payne Bldg., by the Marine Review Pub. Co. CLEVELAND, O., FEBRUARY 16, 1899. Entered at Cleveland Postoffice as second class matter. No. 7

MILLIONS FOR NEW SHIPS.

MORE ROCKEFELLER ORDERS—THIS TIME FOUR VESSELS, TWO STEAMERS AND TWO TOW BARGES, TO BE DELIVERED IN THE SPRING OF 1900—BIG PREMIUMS OFFERED FOR SHIPS NOW ON THE STOCKS.

Orders for four very large steel freighters, two steamers of 6,250 tons each and two tow barges of 7,250 tons each—gross tons capacity in both cases—just placed by the Bessemer Steamship Co. (Rockefeller interest), bring the number of contracts for new vessels of all kinds on the great lakes up to thirty-six and the total valuation to $5,109,000. With two other vessels for the Bessemer fleet—one at Cleveland and one at West Superior, Wis.—already well under way, the aggregate value of Rockefeller orders is fully a million and a quarter. Of these four latest ships, none of which are to be delivered until April, 1900, three will be built by the American Steel Barge Co. of West Superior, and one by F. W. Wheeler of West Bay City, Mich. The West Superior company gets a steamer and a tow barge and F. W. Wheeler a steamer.

"I have just been offered," said Capt. John Mitchell of Cleveland, "a premium of $37,000 cash for the two steamers of 6,000 gross tons capacity each for which I have contracts with the Globe Iron Works Co. of Cleveland." This is an indication of the demand that has sprung up within the past few weeks for modern ships on the lakes. It is in line, of course, with the general rise in values throughout the country. The two ships referred to are costing, according to the contracts made only a short time ago, about $440,000. One of them is to be out early next season and the other along towards the middle of the season. They would now sell for $477,000. The offer was not, of course, accepted, as the owners of these ships are in vessel business; they could not duplicate the orders for next summer's delivery at any price, on account of the crowded condition of the ship yards, and they figure that before the demand for big freight carriers is supplied they will have made, in view of the present outlook, more out of the operation of the ships than the premium which they are now offered. In this there is an element of chance, but just now everything is in favor of the big carriers that are to be turned out from the ship yards in the spring. The steel mills are asking $34 a ton for ship plate, against $22 not long ago, and the best delivery offered is July or August. Material for the three Rockefeller boats, for which orders have just been taken by the American Steel Barge Co., is to be furnished by the Illinois Steel Co., but the mill order for steel for the steamer to be built by F. W. Wheeler is delayed on account of difficulties involved in securing material.

The four latest Bessemer ships will each be 10 feet longer than their predecessors. This will bring the length of the steamers up to 486 feet over all and the barges to 466 feet. Otherwise they are to be duplicates, excepting in minor improvements, of the steamer Morse and barge Roebling. It is understood that F. W. Wheeler has secured control of full two-thirds of the bonds outstanding against F. W. Wheeler & Co., and is again fully in possession of the West Bay City yard, so as to go ahead with the building of the Rockefeller steamer, as well as the steamer for the Spaulding Lumber Co. of Chicago, as soon as steel can be secured from the rolling mills. The question of material is so uncertain, however, that a resumption of operations at the West Bay City yard may be delayed for a considerable time as yet. The order for another car ferry for the F. & P. M. R. R. Co., a duplicate of the Pere Marquette, will also go to the West Bay City yard, if relief is offered within the next few weeks in the matter of material.

Although there are thirty-six vessels now building or under contract in lake yards, it does not follow that all of them are freight carriers or that all will be out next season. The new freighters, twenty-three of them all told, will have a combined capacity of 129,900 gross tons on 17 feet 6 inches draft; but only eighteen of these of 97,700 tons will be out at any time next season, and only eleven of the eighteen are modern ore carriers. The others are steamers of Welland canal size, a lumber carrier, a package freighter building at Buffalo, and a couple of wooden schooners building at the Davidson yard, West Bay City.

With this condition of affairs in the ship yards vessel owners feel, for the present at least, that they have made a mistake in tying up to 60-cent ore contracts for the coming season. The ore shippers have not secured all the tonnage they require on freight contracts, but they have covered such a very large amount of ore that great difficulty will be met with in advancing freights. Still it is quite probable even now, that 60 cents could be had for vessels to carry ore from the head of the lakes during spring and summer months, as against the full season contracts of a few weeks ago, and there is an urgent demand also for vessels to take contract ore from both Marquette and Escanaba. Sixty cents is freely offered for full season contracts from Marquette. The best Escanaba contracts made up to a few days ago were at 50 cents to Oct. 1, but the demand is such as to warrant the opinion that this same rate could now be secured on contracts expiring Sept. 15. Thus the lake freight market seems to be improving from day to day.

GRAIN BILL OF LADING.

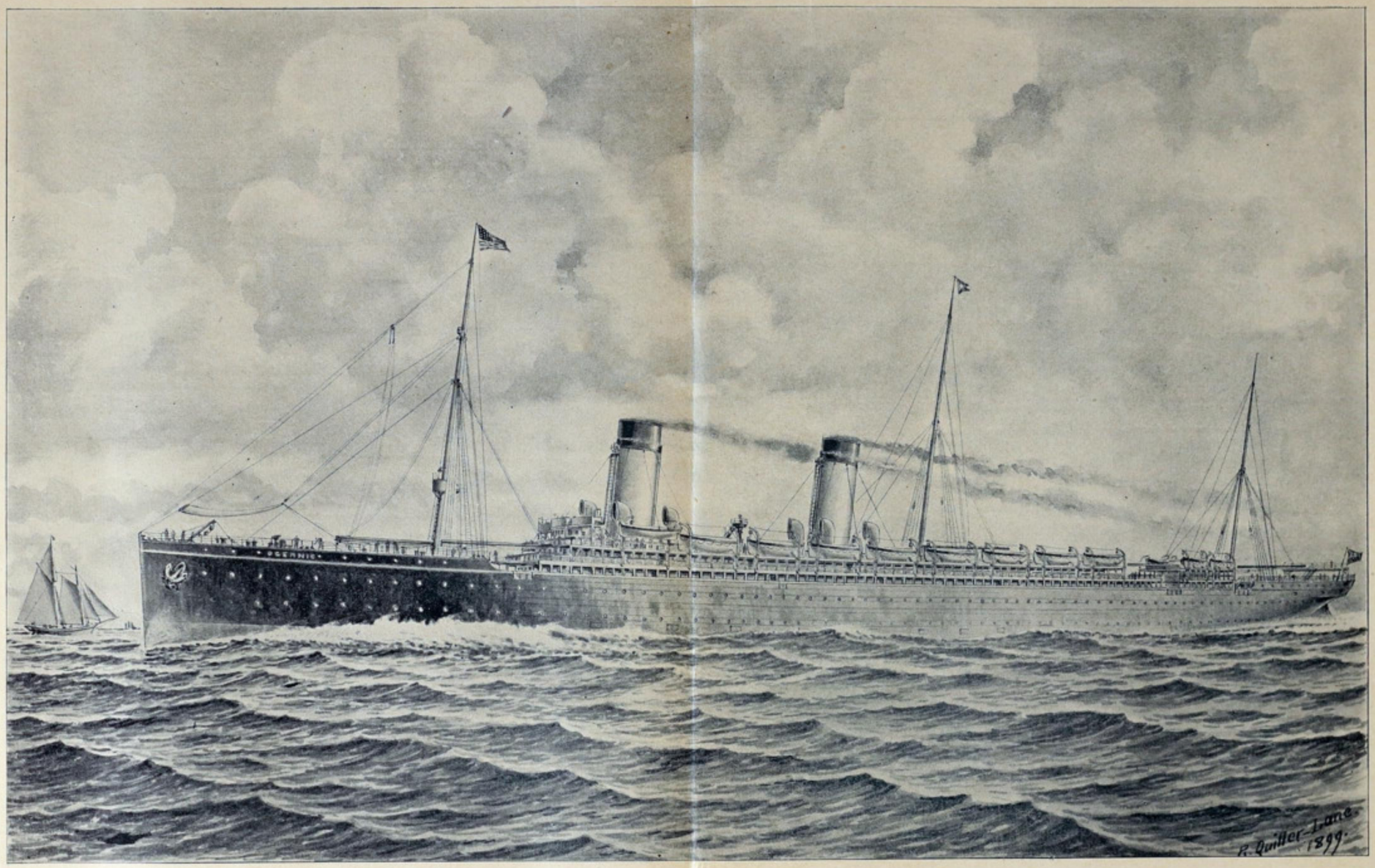
As had been expected, the grain interests are disturbed over the proposition of the Lake Carriers' Association to limit grain shortages as far as lake vessels are concerned, to one-half bushel per thousand, and to insist upon demurrage being paid to the ship when there is a delay of more than twenty-four hours in furnishing an elevator at either end of the route. In a circular dated New York, Feb. 1, and signed by some fifty buyers of grain, the proposed action of the Lake Carriers' Association is said to be in opposition "to free and unrestrained development of commerce on the great lakes," and the present bill of lading is referred to as a "desirable document." It is, of course, a desirable document from the grain man's point of view, but it permits of the ship being subjected to disadvantages that should not have been tolerated for anything like the length of time that vessel owners have patiently allowed the grain interests, no matter who is to blame, to go along ignoring the ship in the matter of definite responsibility as to shortages and as regards unreasonable delay in port. Now a strong committee of the Lake Carriers' Association—the strongest ever appointed—has charge of this question. The grain men evidently realize the strength of this committee, and they probably know also that while the vessel men have talked of a new bill of lading for a great many years they have never before been determined in the matter as they are now. It has been decided to hold a final meeting in Buffalo about March 1. The grain interests will be invited to that meeting. The vessel interests, if they stand by this committee, certainly have it within their power to settle this matter of grain bill of lading. They have in Mr. Frank J. Firth of Philadelphia a president who has already shown ability to lead as the president of such an organization should lead in all its affairs. The systematic manner in which he has taken up several other questions has put new life into executive officers of the association and they are working with him. Everything is favorable to the ship owner in the outlook for the coming season of navigation on the great lakes. He might act arbitrarily in this matter of a change in the grain bill of lading if he was so disposed. But the committee that is to meet with the grain interests in Buffalo about March 1 is composed of cool-headed members of the association who understand the importance of the proposed changes in the grain carrying contract. This committee will not act hastily. A full hearing will be given to everybody interested in the transportation of grain on the lakes, but members of the committee know that this question is of vital importance, even as regards the existence of their association. It has been repeatedly charged that if the Lake Carriers could not bring about a fair adjustment of differences with the grain interests the association had better disband. But the association will not quit. From present indications it is more than probable that there will be a new grain bill of lading next season and its provisions will be more favorable to the ship than the form of contract that has prevailed for a long time past.

THE PRIVATE LIGHT PROBLEM.

In pursuance with the policy mapped out by President Frank J. Firth at a recent meeting of the executive committee of the Lake Carriers' Association looking to a reimbursement of the association by the government for expenditures made for the maintenance of private lights on the great lakes, Treasurer George P. McKay this week submitted to Secretary Keep for presentation to the government, a complete statement covering the whole matter. It shows that during the season of 1894 the association paid to Duff & Gatfield, $1,560 and to Andrew Hackett, $700, a total of $2,260. For succeeding years the payments were as follows: 1895, Duff & Gatfield, $1,560, Andrew Hackett, $900, total, $2,460; 1896, Duff & Gatfield, $2,000, Andrew Hackett, $1,050, Harry Hackett, $1,800, John J. Lynn, $250, Michigan Dock Building Co., $390, total, $5,490; 1897, Duff & Gatfield, $1,750, Andrew Hackett, $1,050, J. J. Lynn, $110.67, total, $2,910.67; 1898, Duff & Gatfield, $1,800; Andrew Hackett, $1,100, total, $2,900. Total for the five seasons, $16,020.67. Capt. McKay also stated in his report that in 1892, the Lake Carriers' association maintained two private float lights to mark the northwest and southwest corners of the Limekiln Cut Crossing, at an expense of $1,000.00, and also a light-ship to mark the westerly edge of Ballards reef channel above the Limekiln crossing, at an expense of $800.00; that all of these lights were subsequently taken charge of and maintained by the United States government, and that on July 15, 1893, the Lake Carriers' Association received from United States government the sum of $1800, as repayment to them of the expense of maintaining the said lights during the season of 1892.

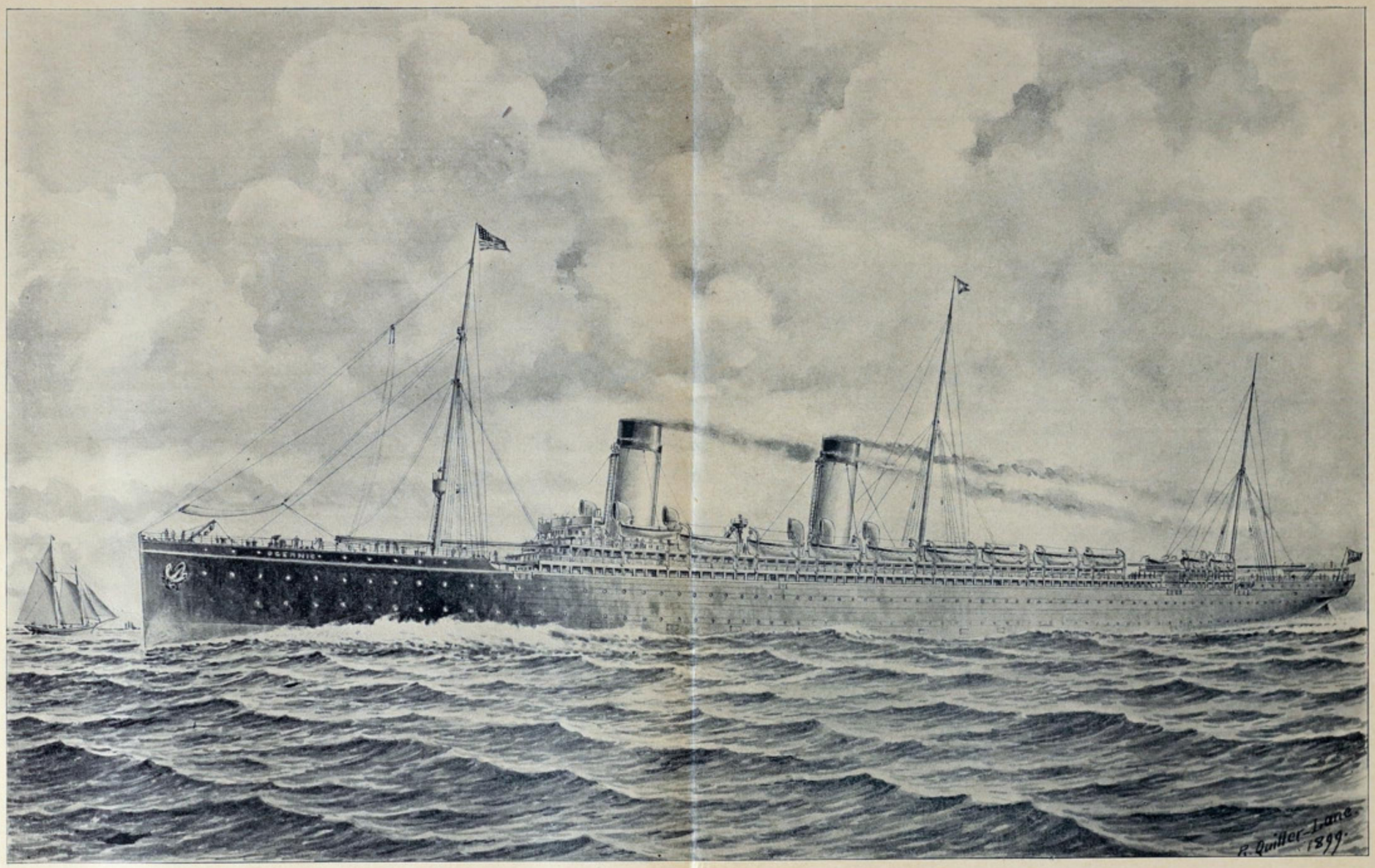
A petition is being circulated for signature by masters certifying that the lights in the Detroit and St. Clair rivers have been maintained by the association and that inasmucn as they are indespensable aids to navigation their continuance is necessary.

It is announced that plants for the manufacture of Babcock & Wilcox boilers will be established in Germany and France.



TWIN-SCREW ROYAL MAIL STEAMSHIP OCEANIC, RECENTLY LAUNCHED BY HARLAND & WOLFF, BELFAST, IRELAND, FOR THE OCEANIC STEAMSHIP COMPANY—WHITE STAR LINE.

FROM A PAINTING MADE FOR THE MARINE REVIEW BY R. QUILLER-LANE, THE ENGLISH MARINE ARTIST.



TWIN-SCREW ROYAL MAIL STEAMSHIP OCEANIC, RECENTLY LAUNCHED BY HARLAND & WOLFF, BELFAST, IRELAND, FOR THE OCEANIC STEAMSHIP COMPANY—WHITE STAR LINE.

FROM A PAINTING MADE FOR THE MARINE REVIEW BY R. QUILLER-LANE, THE ENGLISH MARINE ARTIST.

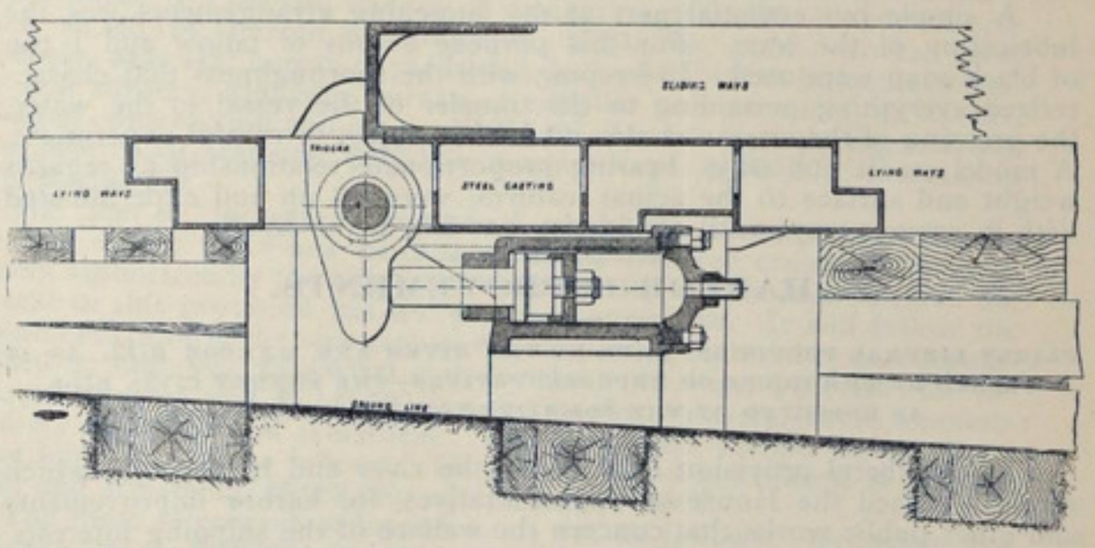
order to get the full advantage of this additional material, it was necessary that the riveting should be of the strongest nature, and the plates in hard contact, so as to get the full effect of frictional resistance to sliding motion. This construction is continued through two-thirds of the ship's length, and by it the top number of the box girder, which the hull virtually forms, is enormously stiffened, both horizontally and vertically. The riveting machines used for this work are probably of larger size than any before employed for like operations, some being 7 feet in the gap. As a complement to what may be described as these top angles on the two sides, the bilge plating has also been doubled, and this, in conjunction with the bilge keels, completes the stiffening of the four corners of the girder. The square bilge and long straight of breadth make this form of construction particularly effective. All rivets are of steel, which, of course, are more difficult to close than iron rivets. Some of them in the bottom are no less than 7 inches long and weigh as much as 3½ pounds. In the keel attachments they are countersunk on the outside, and snap riveted on the inside, and certainly could not have been closed by hand, at any rate as a practical operation. All the holes were drilled true in position by means of electric drills, one plate serving as a template. In the flat bar keel 1¼-inch rivets were used, there being four rows crosswise. The whole of the double bottom was hydraulic-riveted except the intercostals, and, of course, the tank tops. The rivets in the double plating on the top sides are 1¼ inches in diameter. More than 72,000 of these large rivets were closed by hydraulic machines. The upper deck stringer bars are 8½ inches on each flange, and 1 inch thick, these having to be riveted through with two thicknesses of plating each way. Some of the rivets here are 6 inches to 6½ inches long where plates overlap. The plating ranges from ¾ inch up to 1⅛ inch in thickness, the plates running up to 29 feet and 30 feet in length by 4 feet 6 inches to 5 feet broad. In some of the shell plates as many as 900 holes have been made. The plating is of the usual in-and-out construction with all overlap butt joints, except where there are double plates, and here inside and outside straps are worked. The edges of the butts are scarphed and the corners planed, so as to avoid packing pieces or liners.

The longitudinal strength of the vessel is secured in an exceptionally ample manner, as will appear from what has been said, and reference may now be made to the remaining features designed to this end. The inside vertical keel or keelson is 5 feet deep, excepting under the engine room, where it is 7 feet deep, and the scantling proportionately increased. It is stiffened by angle bars in the usual way, and as stated, hydraulic riveted. There are three other longitudinals on each side, worked intercostally between the floors, and beyond these the margin plates, as usual. The floors are full depth of the inner keel on centre line. A special feature of the cellular structure is that it is carried right fore-and-aft up into the peak tanks. The method by which the frames are joined to the double bottom deserves notice, as special attention has been paid to this line of demarcation, which is undoubtedly often a weak part of the hull structure. The frames and frame-brackets are attached to the margin plates by double angles riveted by the hydraulic machines. The floor plates are similarly fastened, the whole being connected together by a thwartship extension of the tank-top plating, thus forming a continuous attachment and stiffening the construction between the cellular structure and the sides of the ship.

On the sides of the hull between the tank top and the orlop deck are two intercostal keelsons worked right fore-and-aft. They are of the usual construction and stiffened by heavy angle-bars attached to the sides by angle steel chocks. The decks and fore-and-aft bulkheads are naturally elements of longitudinal strength, they being further attached in an exceptionally strong manner with this view; all decks are, as stated, continuously plated over the whole area. The coamings of the upper deck-houses, together with the foundation-angles, are more than usually heavy and are very strongly fastened to the deck. The frames are channel section amidships for about two-thirds of the vessel's length. They are of rolled steel 9 inches deep, and 4½ inches on the flange next the skin, and 4 inches inwards. They are spaced 31½-inch centres. At the ends of the ship, angle-bars and reverse angles riveted on in the usual way are worked, here again hydraulic machines being used. On all decks which form a structural part of the hull—that is, all excepting the promenade and boat decks—there is a frame to every beam. For the upper deck bulb beams have been adopted; for the boat deck and promenade deck, angle-beams, and for all other decks 10 inch channel-beams.

ENGINES AND BOILERS.

A full description of machinery of this remarkable vessel can not be published as yet. The two pairs of propelling engines are of the triple-compound, inverted, direct-acting, type, with four cranks. The cylinders are respectively 47½ inches and 79 inches, and two low pressure of 93 inches each, the stroke being 72 inches. High pressure and intermediate pressure cylinders have piston valves and the low pressure valves are double-ported. There are separate cylindrical condensers, two to each set of engines, or four in all. There are double cast-iron columns, each carrying a cross-head guide. The crankshaft is of Whitworth compressed steel, and is built up of four separate pieces. The diameter is 25 inches. The crank pins are 26 inches. There are two separate thrust-blocks to each set of engines; these have loose collars, which can be taken out, so that the engines can be run with only one thrust-block if needed; the main bearings have steel bushes lined with white metal. The engine bed is of cast iron with cross girders carrying the main bearings. There is an air pump to each low pressure cylinder, worked off side liners in the usual way. The link motion is of the ordinary type, the reversing being by steam and hydraulic gear; the main stop valves can be worked by steam; the line shafting is of 23¾ inches in diameter, and of hollow steel; the propeller shafting is 25¼ inches in diameter, also of hollow steel. The



propellers, as already stated, are each three-bladed, and 22 feet 3 inches in diameter. The engines are so arranged that the moving parts will be balanced. This is a feature, in connection with the bilge keels, that is expected to make the Oceanic a very steady ship. The main steam pipes are of welded steel with butt straps riveted on; the smaller pipes are of solid-drawn steel. The stoke holes are not closed, but there are large fans to blow air into them; these will be utilized also for ventilating the ship, their suctions being taken from below decks, and there is an elaborate system of trunks provided for the purpose. The ventilating arrangements in this vessel will evidently be of a very complete nature, there being electrical fans in various parts of the vessel.

The boilers are of the return-tube type, double-ended, opposite pairs of furnaces delivering into a common combustion chamber. They are placed in groups athwart-ships, some having three and some four furnaces. The largest boilers are 16 feet 6 inches in diameter, the shell plates being of special tensile strength steel, and some of them about 1½ inches thick. A feature of the design of the machinery characteristic of Harland & Wolff is that most ample boiler power has been provided. The duplicate system of machinery has been preserved throughout, from the propelling engines of the twin-screw arrangement down to the capstan and windlass gear. The keynote of the ship is safety.

PARTICULARS OF THE OCEANIC AND OTHER NOTABLE BIG STEAM VESSELS.*

Steamer's Name.	Builders.	Date.	Moulded Dimensions. Length.		Breadth.		Depth.		Draught.		Displacement, Load Draught.	Cylinders. Diameter in inches.	Stroke		Working Pressure.
			ft.	in.	ft.	in.	ft.	in.	ft.	in.	tons.		ft.	in.	Lbs. per sq. in.
Great Eastern	Mr. Scott Russell	1858	680	0	83	0	57	6	25	6	27,000	Four 74-in., four 84-in	4	0	15 to 25
Britannic	Messrs. Harland & Wolff	1874	455	0	45	0	36	0	23	6	8,500	Two 48-in., two 83-in	5	0	70
Arizona	Fairfield company	1879	450	0	45	2	37	6	22	0		One 62 in., two 90-in	5	6	90
Servia	Messrs. Thomson	1881	515	0	52	0	40	6	23	3	9,900	One 72-in., two 100-in	6	6	90
Alaska	Fairfield company	1881	500	0	50	0	39	8	22	0		One 68-in., two 100-in	6	0	100
City of Rome	Barrow company	1881	542	6	52	0	38	9	22	0	11,230	Three 46-in., three 86-in	6	0	90
Oregon	Fairfield company	1883	500	0	54	0	40	0	23	0		One 70-in., two 104-in	6	0	110
Paris	Messrs. Thomson	1888	527	6	63	0	41	10	23	0	13,000	Two 45-in., two 71-in., two 113-in	5	0	150
Teutonic	Messrs. Harland & Wolff	1890	565	0	57	6	42	2	22	0	12,000	Two 43-in., two 68-in., two 110-in	5	0	180
Campania	Fairfield company	1893	600	0	65	0	41	6	23	0		Four 37-in., two 79-in., four 98-in.	5	9	165
Kaiser Wilhelm der Grosse	Vulcan company	1897	625	0	66	0	43	0			20,000	52-in., 89¾-in., 93½-in., 96½-in., 96½-in	5	8⅞	178
Oceanic	Messrs. Harland & Wolff	1899	685	0	68	0	49	0	32	6	28,500	47½-in., 79-in., two 93-in	6	0	192

*This table and illustrations reproduced from Engineering, London.

NEW HYDRAULIC DEVICE FOR LAUNCHING.

The hull of the Oceanic certainly represented the heaviest launching weight ever successfully dealt with and the precautions taken in connection with the transfer of the vessel to the water were fully warranted. Without fittings, deck machinery or propulsion machinery—simply the bare hull with sliding ways and cradle—the weight was 10,750 tons. This is more than 1,000 tons in excess of the Great Eastern's weight of hull, the launch of which was not a success as it extended over a period of about three months. The estimated weight of the steamer as she will be ordinarily on her voyages is 28,500 tons.

A device brought into play in the launching arrangements for releasing the sliding ways from the lying ways will undoubtedly be used in the future on ships of great weight. Under the vessel there were three cradles forward, the sliding ways being of exceptionally massive construction. The cradles were held together under the keel by thirty heavy chains, as an additional precaution against spreading. The sliding ways were 520 feet long by 4 feet 6 inches broad. The device referred to was a hydraulic ram and trigger arrangement. illustrated herewith, and which was made by Fielding & Platt of Gloucester. The pressure on the ordinary dog-shores, which serve as struts to hold the sliding ways from starting, is very great with the heavy launching weights of modern times, and there is often uncertainty about knocking these struts adrift, more especially as one side may be released first. By this new arrangement a heavy steel casting is let into the fixed ways. This contains a hydraulic cylinder, the ram of which presses against the end of the trigger, whilst the nose of the latter engages in a slot, which is steel lined and contained in the sliding ways. So long as the ram presses against the trigger as shown, the latter makes a firm connection between the sliding and fixed ways, just as the ordinary side daggers do in the usual method adopted in launching ships. When, however, the pressure on the ram is released, the trigger falls into a horizontal position, and all is thus clear for the sliding ways to run freely. The great advantage of this device is that its action is absolute.

For checking the way of the ship there were at the launch three

anchors on each side weighing together 40 tons, the cables weighing 100 tons. These were hanging in loops on either side of the vessel, or were coiled on the forecastle, and were held in bights by ropes which had to be broken to allow the cable to pay out. In this way the energy of the vast moving body was gradually absorbed, and the vessel brought to rest. All this was effected in a very perfect manner, the ship being brought to exactly the position before determined. The launching period was measured by seconds, the slide down the 520-foot ways, laid at a gradient of 1 in 24, terminating at a speed equivalent to only 10 miles an hour, and thus the vessel entered the water under the safest and easiest conditions.

A simple but essential part of the launching arrangements was the lubricating of the ways. For this purpose 4 tons of tallow and 1 ton of black soap were used. In keeping with the thoroughness that characterized everything pertaining to the transfer of the vessel to the water, the greasing of the ways was also made the subject of careful experiment. A model cradle and ways, bearing proportionate relationship as regards weight and surface to the actual features, were set up and experimented with in various ways until confidence was felt in the result.

HARBOR IMPROVEMENTS.

FAIRLY LIBERAL PROVISION MADE BY THE RIVER AND HARBOR BILL AS IT PASSED BY THE HOUSE OF REPRESENTATIVES—THE SUNDRY CIVIL BILL AS REPORTED BY THE COMMITTEE ON APPROPRIATIONS.

Fairly liberal provision is made by the river and harbor bill, which recently passed the House of Representatives, for harbor improvements and other public works that concern the welfare of the shipping interests. There is every reason to believe that the bill will pass the senate with few if any changes. Appropriations for repairs, inaugerating or completing improvements, etc., are as follows:

Moosabec Bar, Maine	$11,000	Mt. Desert, Me	10,000
Sullivan Falls, Me	5,000	Carvers Harbor, Me	15,000
Cape Porpoise, Me	70,000	Little Harbor, N. H	12,000
Burlington, Vt	15,000	Boston, Mass	75,000
Nantucket, Mass	20,000	Newburyport, Mass	25,000
Plymouth, Mass	10,000	Provincetown, Mass	10,000
Scituate, Mass	4,000	Hyannis, Mass	2,162
Vineyard Haven, Mass	3,000	Sandy Bay, Mass	150,000
Gloucester, Mass	40,000	New Bedford, Mass	44,000
Chatham, Mass	3,732	Woods Hole Channel, Mass.	20,000
Fall River, Mass	20,000	Block Island, R. I	2,500
Newport, R. I	15,000	Great Salt Pond, R. I	25,000
Sakonnet Point, R. I	10,000	Bridgeport, Conn	50,000
New Haven, Conn	50.000	Five Mile River, Conn	2,500
Stamford, Conn	6,000	Norwalk, Conn	2,000
Buffalo, N. Y	125,000	Charlotte, N. Y	7,000
Great Sodus Bay, N. Y	14,000	Little Sodus Bay	5,500
Ogdensburg, N. Y	15,000	Oswego, N. Y	60,000
New York Harbor, N. Y	1,100,000	Tonawanda, N. Y	75,000
Saugerties, N. Y	2,500	Wilson, N. Y	2,500
Port Chester Harbor, N. Y.	25,000	Staten Island channel	32,000
Huntington, N. Y	7,500	Port Jefferson inlet, N. Y.	7,500
Gowanus Creek, N. Y	25,000	Peekskill, N. Y	10,000
Wallabout Channel, N. Y.	20,000	Mamaroneck, N. Y	7,000
Pultneyville, N. Y	2,000	Mattituck, N. Y	5,000
Cape Vincent, N. Y	50,000	Larchmont, N. Y	50,000
Raritan Bay, N. J	65,000	Keyport Harbor, N. J	2,500
Erie, Pa	125,000	Pittsburg, Pa	110,662
Wilmington, Del	45,000	Cape Charles City, Va	20,000
Milford Haven, Va	12,500	Brunswick, Ga	15,000
Savannah, Ga	50,000	Darien, Ga	10,000
Doboy Bar, Ga	70,000	Apalachicola Bay, Fla	20,000
Pensacola, Fla	70,000	Key West, Fla	25,000
Charlotte Harbor, Fla	25,000	Carrabelle Bar, Fla	25,000
Tampa Bay, Fla	75,000	Hillsboro Bay, Fla	125,000
Mobile, Ala	100,000	Ship Is. Pass, Miss	40,000
Calcasieu River, La	35,000	Pass A Loutre, Miss	50,000
Galveston, Texas	50,000	Buffalo Bayou, Texas	150,000
Arkansas Pass, Texas	60,000	Sabine Pass, Texas	50,000
Ashtabula, O	50,000	Lorain, O	50,000
Cleveland, O	75,000	Conneaut, O	100,000
Fairport, O	100,000	Huron, O	25,000
Sandusky, O	80,000	Port Clinton, O	6,000
Toledo, O	50,000	Michigan City, Ind	7,500
Waukegan, Ill	7,000	Chicago, Ill	75,000
Calumet Harbor, Ill	150,000	Charlevoix, Mich	15,000
Frankfort, Mich	35,000	Grand Haven, Mich	10,000
Grand Marais, Mich	25,000	Manistee, Mich	20,000
Black Lake, Mich	37,500	Monroe, Mich	5,000
Muskegon, Mich	60,000	Pentwater, Mich	25,000
Portage Lake, Mich	75,000	Sand Beach, Mich	50,000
St. Joseph, Mich	50,000	South Haven, Mich	10,000
White Lake, Mich	35,000	Marquette, Mich	25,000
Ludington, Mich	25,000	Petoskey, Mich	20,000
Saugatuck Mich	7,000	Menominee, Mich	5,500
Cheboygan, Mich	8,000	Presque Isle Point, Mich	30,000
Ahnapee, Wis	10,000	Green Bay, Wis	28,600
Kenosha, Wis	50,000	Kewaunee, Wis	8,800
Milwaukee, Wis	64,000	Port Washington, Wis	4,400
Racine, Wis	50,000	Cheboygan, Wis	28,400
Ashland, Wis	35,000	Two Rivers, Wis	8,000
Sturgeon Bay Canal	5,500	Oconto, Wis	15,000
Lake Michigan Ship Canal.	30,000	Manitowoc, Wis	3,300
La Crosse, Wis	12,000	Grand Marais, Minn	30,000
Agate Bay, Minn	71,708	San Diego, Cal	50,000
San Luis Obispo, Cal	50,000	Humboldt, Cal	35,000
San Francisco, Cal	100,000	Tillamook Bay, Ore	17,000
Olympia Harbor, Wash	15,000	Everett Harbor, Wash	50,000
Bagaduce River, Me	3,000	Narragaugus River, Me	5,000
Lubec Channel, Me	25,000	Georges River, Me	10,000
Union River, Me	15,000	Saco River, Me	5,000
Cocheco River, N. H	20,000	Otter Creek, Vt	1,000
Narrows, Lake Champlain.	5,000	Powow River, Mass	12,000
Taunton River, Mass	7,000	Weymouth River, Mass	10,000
Essex River, Mass	10,000	Mystic River Mass	50,000
Town River, Mass	8,000	Merrimac River, Mass	40,000
Pawtucket River, R. I	25,000	Connecticut River, Conn	45,000
Housatonic River, Conn	9,600	Thames River, Conn	20,000
Hudson River,, N. Y	100,000	Harlem River	25,000
East River, N. Y	100,000	Browns Creek, N. Y	3,000
Sister Is., St. Lawrence R.	20,000	Niagara River, N. Y	15,000
Bronx River, N. Y	20,000	Passaic River N. J	15,000
Raritan River, N. J	20,000	Shrewsbury River, N. J	10,000
South River, N. J	10,000	South River, N. J	5,000
Alloway Creek, N. J	3,000	Mattawan Creek, N. J	3,000
Shoal Harbor, N. J	8,000	Goshen Creek	3,000
Manasquan River, N. J	5,000	Rancocas River, N. J	2,000
Mantua Creek, N. J	10,000	Allegheny River, Pa	15,000
Delaware River	300,000	Monongahela River	50,000
Appoquinimink River, Del.	5,000	Smyrna River, Del	5,000
Murderkill River, Del	5,000	Broad Creek River, Del	5,000
Mispillon River, Del	2,500	Nanticoke River, Del	3,000
Choptank River, Md	8,000	Chester River, Md	1,500
Manokin River, Md	1,500	Warwick River, Md	2,000
Patapsco River Md	300,000	Pocomoke River, Md	3,000
Potomac River	50,000	Appomattox River, Va	5,000
Nansemond River, Va	5,000	James River, Va	150,000
Nomini Creek, Va	10,000	Deep Creek, Va	25,000
Rappahannock River, Va	15,000	Urbanna Creek, Va	3,000
York River, Va	10,000	Occoquan Creek, Va	2,500
Lower Machodoc Creek, Va	1,500	Guyandotte River, W. Va.	1,000
Little Kanawha R., W. Va.	1,000	Cape Fear River, N. M	152,500
North River, N. C	2,000	Trent River, N. C	1,000
Contentia Creek, N. C	2,000	Neuse River, N. C	5,000
Pamlico River, N. C	15,000	Currituck Sound	8,000
Black River, N. C	1,500	Great Pedee River, S. C	4,000
Fishing Creek, N. C	2,000	Waccamaw River, N. C	3,000
Santee River S. C	20,000	Congaree River, S. C	1,500
Watersee River, S. C	2,500	Chattahoochee River	50,000
Altamaha River, Ga	6,000	Ocmulgee River, Ga	20,000
Flint River, Ga	5,000	Savannah River, Ga	21,000
Oconee River, Ga	5,000	Apalachicola River, Fla	3,000
Coosa River, Ga	20,000	Choctawhatchee River, Fla	16,000
Calcosahatchee River, Fla.	2,000	Manatee River, Fla	10,000
Escambia River, Fla	5,000	Suwanee River, Fla	5,000
Saint Johns River, Fla	125,000	Ocklawha River, Fla	3,000
Volusia Bar, Fla	2,000	Indian River, Fla	5,000
Sarasota Bay, Fla	5,000	Anclote River, Fla	5,000
Chipola River, Fla	5,000	Holmes River, Fla	2,000
Black Water River, Fla	5,000	Alabama River, Ala	50,000
Orange Mills Flats, Fla	40,000	Tombigbee River, Ala	286,000
Black Warrior River, Ala.	50,000	Pascagoula River, Miss	50,000
Big Sunflower River, Miss.	5,000	Tallahatchee River, Miss.	5,000
Pearl River, Miss	10,500	Chickasahay River, Miss.	2,500
Yazoo River, Miss	20,000	Homochitto River, Miss.	16,000
Leaf River, Miss	2,500	Amite River, La	2,500
Mouth Pearl River, Miss.	18,138	Bayou Bartholomew, La.	5,000
Boeuf River, La	6,000	Red River, La	150,000
Tensas River, La	4,000	Bayou Lafourcha, La	7,500
Tickfaw River, La	1,000	Bogue Chitto, La	5,000
Chefuncte River, La	1,000	Bayou Teche, La	10,000
Bayou Vermillion, La	2,500	Johnson's Bayou, La	2,500
Mermentau River, La	6,115	Trinity River, Texas	7,000
Bayou Courtableau, La.	10,000	Brazos River, Texas	65,000
Sabine River, Texas	2,000	Arkansas River, Ark	120,000
Mouth Neches River, Texas	10,000	Black River, Ark	8,000
Saint Francis River, Ark.	8,000	Cache River, Ark	1,000
White River, Ark	14,800	Current River, Ark	5,000
Upper White River, Ark	160,000	Ouachita River, Ark	110,000
Buffalo Fork White R., Ark	3,500	Cumberland River, Tenn.	200,000
Clinch River, Tenn	8,500	Tennessee River, Tenn	165,000
French Broad River, Tenn.	5,000	Forked Deer River, Tenn.	3,000
Obion River, Tenn	2,500	Big Sandy River, Ky	52,500
Elk River, Tenn	4,000	Licking River, Ky	10,000
Green River, Ky	85,673	Bell River, Mich	10,000
Ohio River	475,000	Saginaw River, Mich	40,000
Hay Lake Channel, St. Mary's River	100,000	Black River, Mich	8,000
Pine River, Mich	5,560	Kalamazoo River, Mich	10,000
Detroit River, Mich	100,000	Grand River, Mich	75,000
Grand River, Mich	75,000	Chippewa River, Wis	10,000
Sebewaing River, Mich	32,000	Saint Croix River, Wis	9,000
Fox River, Wis	27,500	Red River, Minn	25,000
Menominee River, Mich	18,920	Red Lake, Minn	5,000
Minnesota River, Minn	1,000	Wabash River, Ind	19,000
Otter Tail Lake, Minn	3,000	Illinois River, Ill	100,000
Calumet River, Chicago	60,000	Mississippi River	520,000
Des Plaines River, Ill	30,000	Gasconade River, Mo	15,000
Red River, La	25,000	Missouri River, Mo	50,000
Osage River, Mo	25,000	San Joaquin River, Cal	20,000
Sacramento River, Cal	30,000	Upper Columbia River, Ore	5,000
Petaluma Creek, Cal	4,000	Coquille River, Ore	25,000
Willamette and Columbia river, Ore	141,000	Clearwater River, Idaho	10,000
Upper Coquille River, Ore	6,000	Puget Sound, Wash	20,000
Cowlitz River, Wash	3,000	Swinomish Slough, Wash	20,000
Chehalis River, Wash	3,000	Okanagon River, Wash	15,000
Willapa River, Wash	5,000		

SUNDRY CIVIL BILL APPROPRIATIONS.

The sundry civil appropriation bill, which has been reported by the committee on appropriations and will ere long receive the attention of congress, contains provision for many interests identified with the shipping. Appropriations for marine hospitals are as follows: Boston, $5,000; Cleveland, $3,500; Detroit, $3,000; Key West, $1,550; Memphis, Tenn., $500; New Orleans, $3,000; Port Townsend, Wash., $1,500; Wilmington, N. C., $2,000. Appropriations for the light house service include $85,000 for a tender for the third district, $15,000 for repairs to light vessel No. 71, $85,000 for tender for the ninth district; for light house depot at Buffalo (tenth district) $50,000, and $100,000 for a tender for the thirteenth district. An appropriation of $15,000 is made for the equipment of the new steamer Pathfinder of the coast and geodetic survey.

Heavy appropriations are made for the continuation of harbor improvement contracts at various ports. An appropriation of $3,000 is made for printing and issuing charts of the great lakes, and $25,000 for surveys, correction of plates, etc. Among the items in the New York harbor appropriations is one of $45,000 for the purchase or construction of a steam tug. An appropriation of $60,000 to be immediately available is included for the completion of the investigations of the deep waterways commission, which is investigating routes between the great lakes and the Atlantic.

In trying to reach the marine trade, big concerns in engineer supply lines now take up systematically the sale of their specialties. Mr. E. P. Gould, representing the Dearborn Drug & Chemical Co. of Chicago, was in Cleveland a few days ago, on a trip around the lakes. This house makes and sells boiler compounds on a big scale and has a special formula for steam vessels of the lakes made to suit analyses of lake water. They have agencies from one end of the lakes to the other, Nash Bros. of Ogdensburg, John S. Parsons of Oswego, C. H. McCutcheon, H. H. Baker & Co. and Bean Shimmerhorn of Buffalo, John Beckman of Erie, Harbor Ship Chandlery and McKinnon Iron Works of Ashtabula, the Upson-Walton Co. and John Thomson of Cleveland and M. C. Alten of Lorain.

Although receivers of the Atlantic Transportation Co. of New York have made every effort to hold, with as little modification of charter as possible, all the lake vessels of their chartered fleet that reached New York and Boston, they have notified the owners of ten barges that were held up in the St. Lawrence, and eight others that got as far as Nova Scotia that they will have no use for these vessels. Claims against some of the vessels in Nova Scotia are so heavy—many of them unwarranted, however—that the lake owners will have considerable difficulty in recovering their property.

HOLLAND SUBMARINE BOAT.

THE BUSINESS AND THE PATENTS OF THE COMPANY WHICH BUILT IT TAKEN OVER BY A NEW CORPORATION WITH HEAVY CAPITAL—THE MEN INTERESTED.

It is stated that President Clement A. Griscom of the International Navigation Co. and other gentlemen prominent in shipping and financial circles are interested in the reorganization of the Holland Torpedo Boat Co., which was effected by the incorporation in New Jersey last week of the Electric Boat Co. with a capital of $10,000,000. The newly incorporated concern acquires the patent rights, franchise and good will of the Holland company. At the head of the new company is Isaac L. Rice, president and a director of the Electric Storage Battery Co., one of the largest concerns of the kind in the world, and which was incorporated in 1894 under New Jersey laws with a capital of $13,500,000. Robert McA. Lloyd, constructing and chief engineer of the electric company, has been chosen vice president of the Electric Boat Co. There will be no consolidation of the two companies but they will be conducted with reference to mutual interests.

The formation of the new company is due to the use in the Holland boat of the storage battery manufactured by the Electric Storage Battery Co. The result has proven so satisfactory that it was decided recently to enlarge the scope of each company and build not only sub-marine boats, but all description of craft to which electricity may be applied as a motor power. Ferryboats and river craft of all descriptions will be built by the Electric Boat Co. with electricity as the propelling power.

The new company acquires the existing patents and good will of the Holland company, the former being valued at $5,000,000. The Electric Boat Co. also acquires the submarine torpedo boat Holland, valued at $65,000, and the submarine torpedo boat Plunger building at the Columbian Iron Works, Baltimore, for the United States government, and there is due to the Holland company in payment of the latter vessel a contingent equity of $150,000 out of the appropriation of $350,000 by act of congress in 1897 for the construction of two submarine boats. The Holland patents, taken out in almost every country in the world, cover among other things many important features in electrical propulsion, including the combination of automatic and manual control of any steering gear and the automatic compensation for weights expended. Among the patents in submarine operation acquired are those for the automatic method of straight gearing while submerged and an immovable center of gravity, and a number of other patents are pending.

The capitalization of the Electric Boat Co. will include $5,000,000 in preferred stock paying 8 per cent non-accumulative and sharing with the common stock pro rata in all further dividends, after the common stock shall have received 8 per cent dividend in any one year; $5,000,000 issued on common stock to be issued for property, fully paid and non-assessable. The company will make a first issue of $250,000 of its preferred stock at par, and arrangements have been made by means of which a bonus of 250 per cent of common stock will be given to subscribers of this issue. It is claimed that the amount of this issue will be sufficient to pay off all the obligations of the Holland Torpedo Boat Co., thus making its assets free and clear, and will provide in addition a working capital of $100,000, an amount which will be amply sufficient for the time being. Out of the preferred stock an issuance of 1,400 shares will be made at par to the Holland Torpedo Boat Co. as payment of its cash investments. The balance is to remain in the treasury of the company.

AMERICAN STEEL BARGE CO.'S IMPROVEMENTS.

There will be no better equipped ship building plant on the great lakes than that of the American Steel Barge Co. at West Superior, Wis., when the improvements now under way or contemplated have been completed. General Superintendent D. E. Ford gives to the Review some particulars of the work now in progress. Work on the new dry dock has, he says, already been commenced and preparations are being made for the erection of a large building between the new and old docks, to better facilitate repairs in dry dock. The new mold loft and carpenter shop is finished and the spacious floor 260 feet long by 60 feet wide, is now being used for the laying down of new construction. A new locomotive hoist of 20 tons capacity, manufactured by the Industrial Works, Bay City, Mich., has been installed with tracks running through the yard in every direction, which will permit of material being handled quickly and cheaply.

The machine shop is being equipped with a complete outfit of large tools for the construction of all kinds of marine and stationary engines of the largest size. Among the new tools recently installed is a large coping machine and mangle rolls manufactured by the Hilles & Jones Co. of Wilmington, Del. It is the intention of the West Superior company to carry out in the early spring such changes in their yard as moving and remodeling the punch shop, lengthening the slips, etc., so that it will be possible to accommodate any length of vessel that owners are likely to want for many years to come.

The barge building for the Standard Oil Co. is plated and riveted up and out side of rigging and outfit is practically complete. She will be launched as soon as the ice softens. The Bessemer Steamship Co.'s new barge, ordered some time ago, is growing at a rapid rate, the bottom being fully two-thirds in frame with the bulk of the bottom shell on, and preparations are being made to begin work as soon as possible on the three other big steel freighters for which the barge company has just received an order from the Bessemer company.

P. McDonnell of Duluth, Minn., was the lowest bidder for the work of building the substructure for the north pier, Duluth ship-canal, bids for which were opened recently by Major Clinton B. Sears, United States engineer at Duluth. In the following complete list of bids the figures given first in each instance are for the total contract with under water patch bolting, while the second figures are for the entire work without under water patch bolting: Engle, Osman & Schleuner, Duluth, Minn., $228,146.46, $225,906.46; Butler-Ryan Co., St Paul, Minn, $160,833, $160,333; Parnett & Record Co., Minneapolis, Minn., $192,414.50, $191,414.50; King & Steele, Duluth, Minn., $212,858, $205,014; Lang & Stone, St. Paul, Minn., $229,049.75, $228,929.75; Hugo & Tims, Duluth, Minn., $169,940, $168,148, and P. McDonnell, $148,966.50, $148,466.50.

NEW NAVAL APPROPRIATION BILL.

The naval appropriation bill will, from this time forward, be one of the measures that will receive considerable attention in congress, and from the very nature of the bill it is certain to engender no small amount of discussion. The bill as originally announced last week appropriates a total of $45,158,605, divided under the following main heads: General establishment, $13,236,440; bureau of navigation, $505,125; bureau of ordnance, $3,143,124; bureau of equipment, $2,615,455; public works, yards and docks, $454,442; bureau of yards and docks, $4,524,286; bureau of medicine and surgery, $192,500; bureau of supplies and accounts, $3,220,432; bureau of construction and repair, $3,273,407; bureau of steam engineering, $1,207,900; naval academy, $217,120; marine corps, $1,336,971; increase of navy, $11,192,402.

The item of "increase of the navy" covers the amount given for the first year on the three new battleships, three armored cruisers and small cruisers authorized by the bill. Although the ships have been decided on, the text of this provision has not yet been agreed to. It will follow the recommendations of the secretary of the navy, with the total of cost recommended by him, viz., $3,500,000 each for the battleships, $4,000,000 for the armored cruisers and $1,141,500 for the smaller cruisers; these amounts exclusive of armor and armament. The $11,192,402 carried for the ships in the bill is divided as follows: Construction and machinery, $5,992,402; armor and armament, $5,000,000; equipment, $200,000.

The most important ordnance items are as follows: Ordnance and ordnance stores, $300,000; reserve supplies, ammunition, $500,000; smokeless powder, $1,000,000; smokeless powder factory, $25,000; reserve guns for auxiliary cruisers, $250,000; torpedo station, Newport, $65,000; naval magazine, Port Mifflin, $68,000; naval magazine, New York harbor, $600,000; naval militia, $60,000; ordnance machinery, League Island, $60,000; naval magazine, Norfolk, $27,500. The important items of the equipment bureau are: Equipment of vessels, $2,225,480; depots for coal, $250,000; ocean and lake surveys, $100,000.

The pay of the navy is $12,726,440. Under the bureau of navigation, gunnery practice receives $12,000; Newport, R. I., naval station, $155,000; Yerba Buena naval training station, $80,000; naval war college, $9,200; naval home, Philadelphia, $76,426.

The bureau of construction receives $3,000,000 for the construction and repair of vessels, and $250,000 for construction plants at yards and docks. Under the head of marine corps, $81,000 is given for the erection of buildings at Annapolis. The academy does not, however, receive the $2,120,000 estimated for an extensive plan of new buildings. Public works in various parts of the country are provided for as follows: Portsmouth (N. H.) navy yard, $306,000; Boston navy yard, $367,000; Brooklyn navy yard, $612,062; League Island, $755,767; Washington (D. C.) navy yard, $205,500; Norfolk navy yard, $645,687. Naval stations—New London, $25,000; Port Royal, $145.000; Key West, $112,520; navy yard, Mare Island, $851,750; Puget Sound naval station, $48,500; repairs at navy yards, $450,000.

The naval committee has since decided upon a reduction of $1,000,000 in the armor and armament for the new ships in the bill. This reduces the total allowed this year for the increase of the navy to $10,192,402, and the total for the bill to $44,158,605. Further changes will likely be made before the measure passes both houses.

The protracted law cases which have been pursued in England by the Magnolia Anti-Friction Metal Co., Limited (London branch of the Magnolia Metal Co. here) in defense of their rights to their brand and their business, has been decided in their favor against John Sugden, W. E. Watson, A. G. Brown, the Atlas Bronze Co., Limited, and the Atlas Metal Co., Limited, and others, who were enjoined respecting patents (trade marks) and from engaging in any anti-friction metal business, with costs and damages. The text of the decision, as appears in the English papers at hand, is very severe and sweeping.

Officers of the Cleveland City Forge and Iron Co., recently elected, are as follows: President, R. H. Harman; vice president and general manager, L. M. Coe; assistant manager, R. A. Harman; treasurer, W. W. Hayward; secretary, George Canning; directors, Edward Charpentier, Ralph Worthington, R. H. Harman, L. M. Coe, R. A. Harman, W. W. Hayward, George Canning.

The Hilles & Jones Company of Wilmington, Del., has given out a contract for a new machine shop. It is to be a steel frame building, about 80 by 150 feet, and is to be used principally for erecting heavy machine tools for ship yards, boiler shops, etc. The shop is to be equipped with a 40-ton four-motor traveling crane and all modern appliances.

Samuel Holmes, whose offices for negotiations in building, purchasing, chartering and selling steam vessels are at 66 and 68 Broad street, New York City, has just issued another circular, listing this time upwards of 500 steam vessels of all classes which he has for sale.

L. W. Ferdinand & Co., 184 Federal street, Boston, Mass., dealers in all kinds of hardware and yacht and boat fittings, have just issued a neat little booklet giving full particulars regarding the new Southern Union station at Boston, the greatest railway depot in America.

The new twin-screw steel steamship to be built by the Columbian Iron Works for the Hartford & New York Steam Transportation Co., has been laid down in the mold loft at the Columbian plant, and material has arrived to begin the work of construction.

The Pusey & Jones Co., Wilmington ship builders, write the Falls Hollow Staybolt Co. of Cuyahoga Falls, O., that they are about to use hollow staybolt iron in a marine boiler and speak very highly of the iron.

A visit to the national capital may be enjoyed without extra cost for fare in going to Philadelphia and New York over Pennsylvania short lines. Tickets to those points via Washington may be obtained at same fares as apply over Pennsylvania direct lines, and will be good for ten days' sojourn at the national capital. For particular information apply to Pennsylvania lines ticket agents or address C. L. Kimball, assistant general passenger agent, Cleveland.

MARINE REVIEW

Devoted to the Merchant Marine, the Navy, Ship Building, and Kindred Interests.

Published every Thursday at No. 418-19 Perry-Payne building, Cleveland, Ohio, by THE MARINE REVIEW PUBLISHING CO.

SUBSCRIPTION—$2.00 per year in advance. Single copies 10 cents each. Convenient binders sent, post paid, $1.00. Advertising rates on application.

Entered at Cleveland Post Office as Second-class Mail Matter.

"There was really no need of denying that story about John D. Rockefeller selling out his vessel, railroad and dock interests on the lakes to the Carnegie company," said a Cleveland mine owner who is always well informed as to what is going on among the big interests in iron and steel. "We are learning of a great many combinations these days, but some of them are simply of the kind that originate over Scotch whisky and soda at the Waldorf in New York. John D. Rockefeller had his son take up his lake interests only a short time ago, and would not be liable to sell on that account, but suppose he should sell, where would he put the money and get a better return on it? It is true that he was forced into taking up the development of Minnesota iron properties, and probably did not relish his investments in the beginning, but there is now no short line of railway in the world more profitable than his Minnesota ore road. Mr. Rockefeller's investments in vessel property must certainly be highly satisfactory to him or he would not go on building ships on the wholesale plan that is being pursued by the Bessemer company. The six ships now under contract for this company in lake yards, to say nothing of the big fleet already in commission will be worth about $1,250,000 when finished. In the talk about the sale of Rockefeller interests on the lakes to the Carnegie company a point of news seems to have developed. One of the representatives of the Carnegie company was quoted as saying that the lake freight contract between these two big interests is so drawn that it may be abrogated at any time upon specified notice. This probably explains why the Rockefeller interest accepts the rate of lake freight established by season contracts, as was the case a few weeks ago, instead of holding out for the going rate of freight which they have a right to do. The supposition is that if the Rockefeller interest should refuse to accept the contract rate, the Carnegie Steel Co. might then give notice of abrogation of contract and go ahead with the building of ships."

The demand for good securities of all kinds, due to a disposition on the part of almost everybody to make use of idle money, has finally reached the standard Lake Superior iron mining stocks. Not long ago Republic Iron Co. stock sold at $5.50 and Chandler Iron Co. at $31. The par value in both cases is $25. These low prices were made, of course, in time of general depression. Now $16.25 is being paid for Republic, and although Chandler paid a dividend of $10 a share only a few days ago, it is held at $60 by most owners of shares. Sales of Lake Superior Iron Co. stock have been made at $37.50 and Cleveland-Cliffs at $65. For Pittsburg & Lake Angeline $125 is bid, but it is not probable that much of it could be secured at $150.

Prompted by the success of the Lake Carriers' Association, the vessel interests of the Gulf and South Atlantic ports are making an effort to form a similar organization. Capt. Fitzgerald, superintendent of the Plant line at Tampa, has asked for bylaws of the lake association and any other matter that will assist him in the work of organizing vessel interests on the long stretch of coast extending from Wilmington, N. C., to and including Galveston, Tex.

When money is seeking investment the schemers are active. It was thought that that worst of all steamship "fakes," the Howard Cassard, was dead and buried. But it is said that almost anything can be floated in an investment way these days, and it is not surprising therefore that dispatches from Baltimore announce the intention of some promoter to float the Howard Cassard.

INCREASE OF TANK VESSELS.

One of the striking features of the development of the steel ship building industry within the past few years has been the rapid growth in size and number of the steamers and sailing vessels for the transportation of oil, water and other fluids in bulk. There are at present in the merchant navies of the world a total of 164 steamers of this class, aggregating 383,086 registered tons, twelve sailing vessels of 12,344 tons and four ferries of 5,594 registered tons. The first tank steamer appeared in Geestemünde harbor in July, 1886, bearing the appropriate name of Glückauf (good luck). It was built for a German owner according to his own specifications. Twelve years later the number of tank vessels had reached the figure of 180, distributed amongst the following countries:

	Vessels.	Gross register tons.
Germany	22	65,112
America	10	16,987
England	70	210,586
Russia	36	30,673
Holland	18	37,714
France	6	11,858
Belgium	5	11,916
Denmark	3	4,819
Norway	1	1,780
Sweden	1	207
Austria	1	2,370
Egypt	1	449
Spain	6	6,553
Totals	180	401,024

DELAWARE RIVER IMPROVEMENTS.

AN INTERESTING COMPARISON OF THE FACILITIES OF THE PRINCIPAL ATLANTIC PORTS MADE BY REPRESENTATIVES OF PHILADELPHIA'S SHIPPING INTERESTS.

When the river and harbor appropriation bill came up in the House of representatives last week it found the advocates of a liberal appropriation for the improvement of the Delaware river fortified with a line of argument backed up by facts that could not well be disregarded. This was the result of the interest taken in the matter by President Clement A. Griscom of the International Navigation Co. and other gentlemen prominently identified with shipping interests, to which was added the hearty co-operation of the officers of the various ship building establishments on the Delaware. The Review has summarized some of the arguments presented.

The harbors of Boston, New York, Philadelphia, Baltimore and Norfolk cover the principal seaports of the North Atlantic coast. Thirty years ago the channels of approach to these harbors carried a natural depth of from 17 to 19 feet, except New York harbor which had a depth of 23 feet. At that time the dimensions of ocean carriers did not require channel and harbor depths exceeding 18 feet. At the present time provision has been made for a 27-foot channel for Boston harbor; New York has a 30-foot channel, which it is proposed to deepen to 35 feet; Baltimore has a 30-foot channel, and Norfolk has just completed a 29-foot channel. The channel of approach to Philadelphia harbor through the Delaware river has a less depth than 24 feet. In other words, the Delaware river carries today channel depths that the other North Atlantic ports outgrew years ago and discarded as inadequate for the requirements of modern ocean commerce.

The Philadelphians showed that if reiteration is required of the statement that modern ocean carriers demand increased channel depths, the following table of the actual draft of steamships entering New York harbor gives emphasis to the facts previously stated:

Steamer.	Draft.		Steamer.	Draft.	
	Ft.	in.		Ft.	in.
Kaiser Wilhelm der Grosse	28	1	Idaho	29	0
Kaiser Frederick	28	2	Minnewaska	29	0
Fürst Bismarck	28	2	Normannia	29	0
Paris	28	3	Campania	29	1
Friesland	28	4	Cevic	29	3
Bovic	28	4	Georgic	29	3
St. Paul	28	5	Phœnicia	29	3
New York	28	5	Lucania	29	6
Umbria	28	5	Cymric	30	0
Tauric	28	5	Patria	30	0
Auguste Victoria	28	5	Kensington	30	1
Etruria	28	7	Southwark	30	2
Victoria	28	8	Palat a	30	6
Alexander	28	8	Pretoria	31	6
St. ouis	28	11	Pennsylvania	32	0
America	29	0	Bulgaria	32	0
Aurania	29	0			

Experience has demonstrated that the larger ships are the cheapest carriers; but it follows as a natural consequence that the larger ships have the greatest draft, and therefore tneir advantages can only be realized by such harbors as have sufficient depth to permit their entrance.

In 1897 the value of the foreign commerce of the port of Philadelphia, as determined by the customs returns, was $95,406,000; the revenue collected was $13,923,000. The entire amount appropriated by the Government, from the earliest date, for the improvement of the channel of the Delaware river has been $2,972,000. From this it is seen that for each dollar appropriated for the improvement of the Delaware river by the government over $32 in value of foreign freights passed through these channels in the single year of 1897, and that for each dollar that has been expended on its improvement the government collected in revenues in the single year 1897, $4.70.

The improvement of the Delaware is progressing under the continuous contract plan appropriations. In the present sundry civil bill $300,000 is provided for the work. Col. C. W. Raymond, United States engineer in charge, estimates that to secure a channel between Philadelphia and deep water in Delaware bay 600 feet wide and 30 feet deep at low water 32,375,000 cubic yards of earth and 12,100 cubic yards of rock will have to be removed, at an aggregate cost of $5,935,000.

MORE CONTRACTS FOR NEWPORT NEWS.

Announcement was made this week that the Newport News Ship Building & Dry Dock Co. of Newport News, Va., has been awarded the contract for two new steamers for the Pacific Mail Steamship Line, in which Collis P. Huntington, the principal stockholder in the ship building company, is interested. The new vessels will be sister-ships, and the dimensions of each are given as 550 feet length and 63 feet beam. Inasmuch as the American liner St. Louis is only 535½ feet in length by 63 feet beam, it will be seen that these new steamers will be the largest vessels ever constructed in America.

The placing of these new contracts, if the information is authentic, makes the record of the Newport News company even more remarkable. There are now under contract at the yard fourteen vessels, having an aggregate tonnage in excess of 100,000 tons, and the value of which is approximately $18,580,000. The list includes the battleships Kearsarge and Kentucky, each of 11,525 tons and valued at $2,250,000; the battleship Illinois, 525 tons, valued at $2,595,000; battleship Missouri, 12,500 tons, $2,885,000; monitor Arkansas, 3,000 tons, $960,000; four steamers for Morgan line, each 4,660 tons and $600,000; two steamers for Cromwell line, each 4,660 tons and $600,000; harbor tug, Morgan line, $40,000; two steamers Pacific Mail Steamship Co., each 12,000 tons and $2,000,000.

The Russian government has ordered from the Vulcan Co. of Stettin, Prussia, a 6,250-ton cruiser. Three battleships of 12,800 tons and two cruisers of 3,000 and 6,000 tons respectively will shortly be laid down in Russian yards.

NAVAL DRY DOCKS.

A CHECK PLACED ON THE PROVISION OF ADEQUATE ACCOMMODATIONS OF THIS CHARACTER FOR THE UNITED STATES NAVY BY THE REFUSAL OF THE HOUSE COMMITTEE TO ACCEDE TO SECRETARY LONG'S RECOMMENDATION IN FAVOR OF MASONRY INSTEAD OF WOOD DOCKS— FULL DISCUSSION OF THE ADVANTAGES OF GRANITE.

The refusal last week of the house committee on naval affairs to accede to the recommendation of Secretary of the Navy Long that the plans for the new dry docks authorized last year be changed so as to permit of their construction of masonry rather than of wood, is regarded by naval men generally as an obstacle to progress if not an actual step backward. It will be remembered that in the authorization for four timber dry docks the secretary was directed at his discretion to build one of the docks of granite or concrete faced with granite. When bids were submitted for the construction of the Boston dock, mention of the award of which is made elsewhere in this issue, the figures demonstrated that a granite dock could be built at such slight increase of expense that the department officials changed their recommendation for wooden docks to stone docks, desiring the incorporation of the revision into the naval appropriation bill. This, it seems, the committee has seen fit to refuse.

The dry dock problem is certainly worthy of consideration by all persons whose official duties bear upon the subject, for it is a patent fact that the accommodations of the United States navy in this vital branch of the service are meager in the extreme when compared with those which are at the disposal of other naval powers of the world. The docking facilities of the United States at present available may be summarized as follows:

UNITED STATES NAVAL DRY DOCKS.

Character	Stations.	Material of Construction.	Length on floor.	Width of entrance at coping.	Depth over sill at mean high water.
			Ft. In.	Ft. In.	Ft. In.
Balance	Portsmouth, N. H.	Wood	350 0	90 0	25 0
Graving	Boston, Mass.	Granite	367 5½	60 0	24 10
"	New York, N. Y.	"	338 3	66 0	25 3
"	" "	Wood	459 10	85 0	25 6
"	" "	"	626 8	105 2⅞	29 0
"	League Island, Pa.	"	459 10	85 0	25 6
"	Norfolk, Va.	Granite	302 9	60 0	25 0
"	" "	Wood	459 10	85 0	25 6
"	Port Royal, S. C.	"	459 0	97 0	26 0
"	Mare Island, Cal.	Granite	459 0	80 6⅞	27 6
"	Puget Sound, Wash.	Wood body, masonry entrance	618 6	92 7⅞	30 0

Accompanying the recently submitted recommendation of Secretary Long, mention of which is made above, was an exhaustive and very valuable special report, in which Commodore Mordecai T. Endicott, chief of the bureau of yards and docks makes one of the fullest presentations ever prepared of the comparative merits of timber and granite docks. The great number of dry docks now in process of construction or projected at the principal private ship yards of the United States make this subject one of primal importance to almost everybody identified with the ship building industry, and the Review presents herewith the full text of Commodore Endicott's report. He says:

"Congress at its last session made appropriations for the construction of four timber dry docks—one to be located at the navy yard, Portsmouth, N. H.; one at the navy yard, Boston, Mass.; one at the navy yard, League Island, Pa., and one at the navy yard, Mare Island, Cal.—to cost, when completed, not exceeding $825,000 each, and the secretary of the navy was authorized in his discretion to build one of said docks of granite or concrete faced with granite. In such case, the limit of cost of said dock was increased $200,000, making it $1,025,000. You exercised the discretion given you by the law providing for the construction of said docks, and decided that the one to be constructed at the navy yard, Boston, should be of granite or concrete faced with granite.

"In pursuance of the law and your instructions thereunder, the bureau prepared plans and specifications for a dry dock of the largest size, calling for bids for its construction entirely of granite and also of concrete and granite. Invitations for proposals were advertised Dec. 27, 1898, and the bids were opened at the bureau on Jan. 31, 1899. The lowest bid received was for a dry dock constructed of concrete and stone, amounting to $842,400, and for the pumping and other machinery, $130,000, making the lowest aggregate for the dry dock complete, with accessory structures, $972,400, or $52,600 within the limit fixed by law for the cost of this structure.

"As congress has fixed for each of the timber dry docks a limit of cost of $825,000, it is seen that a concrete and stone dry dock can be constructed for about 25 per cent. additional to the cost of a timber dry dock of the same general dimensions and equipment, as fixed by congress. The result of this advertisement for proposals is more favorable than was anticipated, as, from such information as the bureau could obtain and from the cost of similar work in the past, it seemed extremely doubtful that such a dry dock could be contracted for at a cost near the limit fixed by congress. In the past all the timber dry docks built for the United States government have been by contract, after public competition, as to price, and all the masonry dry docks built for the United States government have been constructed by day's labor by government employees and extending over long periods of time, due chiefly to the method adopted in appropriating for the works in partial sums from time to time. The present is the first time in the experience of the navy that it has been possible to compare the relative cost of timber and masonry docks of approximately the same size and built under substantially the same conditions. The indications are exceedingly favorable and show the increased cost of a stone and concrete dock over a timber dry dock to be such as to render it extremely inadvisable, in the opinion of the bureau, to undertake again the construction of a timber dry dock for the United States navy. The superior advantages of the former dock, considered in connection with the moderate increased cost as now developed, should, perhaps, be sufficient to determine this matter without further argument; but I beg to set forth briefly some of the reasons why it is true, and suggest to the department the propriety of now recommending to congress the advisability of reconsidering its action in the provisions made for the construction of the timber dry docks mentioned in the beginning of this letter, in the act making appropriation for the naval service, approved May 4, 1898.

"A timber dry dock is a temporary structure, and the distinctive material of which it is built—wood—requires very extensive renewal at the end of twenty-five years, amounting in some instances, and in some climates, to a practical rebuilding. While the first cost of a timber dry dock is considerably less than that of a masonry dry dock, the annual expenditure for its repairs and maintenance, having reference to the dry dock structure proper, which is the only proper basis for comparison, is many times larger than that for a masonry dock. This is not mere speculation, but the condition of the timber dry docks heretofore built for the navy, no one of which exceeds ten years in age, shows that they have already entered upon a period when the perishable material—wood—has so far deteriorated as to require considerable repairs, and the repairs already made and those provided for in special appropriations made by congress for the purpose show that what was claimed to be a cheap dock, is really proving to be a very expensive one in the end. Another and important consideration is that of stability and safety of the struture. Of two timber dry docks of the same general design and construction, differing in depth, the one of greater draft is subjected to much more unfavorable conditions, and the hydrostatic pressure, which is the force to be met and provided for more than any other in graving docks, is very much greater, and the stability and safety of such a structure against this force, tending to rupture the bottom or sides, decreases with the depth, and while the question of stability and safety of such a dock may be a comparatively simple one, where the depth is shallow, it becomes one of great importance, magnitude and risk in the very deep docks which it is now necessary for the navy to provide for its deep-draft cruisers and battleships. Accidents of this character have occurred, more or less serious, in several of the timber dry docks owned by the government, extending from the bursting in of the altar system, as at League Island, Port Royal and New York, to the distortion of the floor of the dock, as at Port Royal, and the partial collapse in the case of dry dock No. 3 at New York.

"Dry docks are structures about which, when built, there should be no doubt, and it is quite safe to say that such freedom from risk in the case of a very deep dock can only be obtained from one built of masonry. A timber dry dock, for its integrity, depends upon the success of pinning it down to the soil, or in admitting the water so freely to its interior as to relieve the pressure, making it a very leaky dry dock, and even with these precautions safety cannot be considered as assured. A masonry dock is designed to resist the dangerous force referred to above by its own weight, and when so designed and well built, making a water-tight structure, it is absolutely safe. The highest authorities upon the construction of dry docks state that the preference is given to those dry docks because of their stability. The masonry docks built for the navy vary in age from ten to about sixty-five years. They have been entirely successful, and, with the exception of one, the repairs to the dry dock structure proper may be said to have been insignificant. The only considerable individual repair to a masonry dry dock in the history of the navy was to the one at the New York navy yard, amounting to about $100,000, during its life of forty-five years, while the repairs to one of the two timber dry docks at the New York yard have cost $171,000 in one instance, and the other will soon receive an outlay of $300,000 to repair natural deterioration and substitute a masonry for a timber entrance, all within an age of 10 years. The records of the cost of repairs to the masonry docks have not been compiled with great exactness because of the difficulty of consulting fully all the old records in connection with them, but sufficient has been obtained to show that what is herein stated is substantially correct.

"In consideration of all the circumstances, the bureau has thought it to be its duty at this particular time, when it has been found possible to contract for the construction of a first-class concrete and stone dry-dock of the largest size for about $1,000,000, and when the department is about to enter upon the construction of three timber dry docks, at a limit of cost for each of $825,000, to urge that the matter be presented for the consideration of congress, with the department's earnest request that the law be changed to allow of the construction of three dry docks of stone or concrete and stone, of the largest size, at a limit of cost of $1,100,000 each, in lieu of the three to be of timber, as provided for by the act approved May 4, 1898."

MANGANESE BRONZE FOR THE SHAMROCK.

According to cabled reports a definite decision has been reached to use maganese bronze plates in the construction of the yacht Shamrock, the boat which Sir Thomas Lipton is building to sail for the America's cup. Tests with various metals were made before the manganese bronze was definitely decided upon. It is claimed by some yachting authorities abroad that the use of the metal will place the British yacht on more even terms with the American boat than in any previous international race for the America's cup. One of the experts is quoted as saying: "We have occasion to test many different metals and alloys for special fittings and have not yet found anything so flexible as this alloy. It is very costly, and the plates will probably run to $400 or $500 per ton. It is also very difficult and costly to work."

Naval Constructor John F. Hanscom is now stationed at Cramps' yard, Philadelphia, as superintending constructor of the government vessels building there. His address is 1714 Jefferson street.

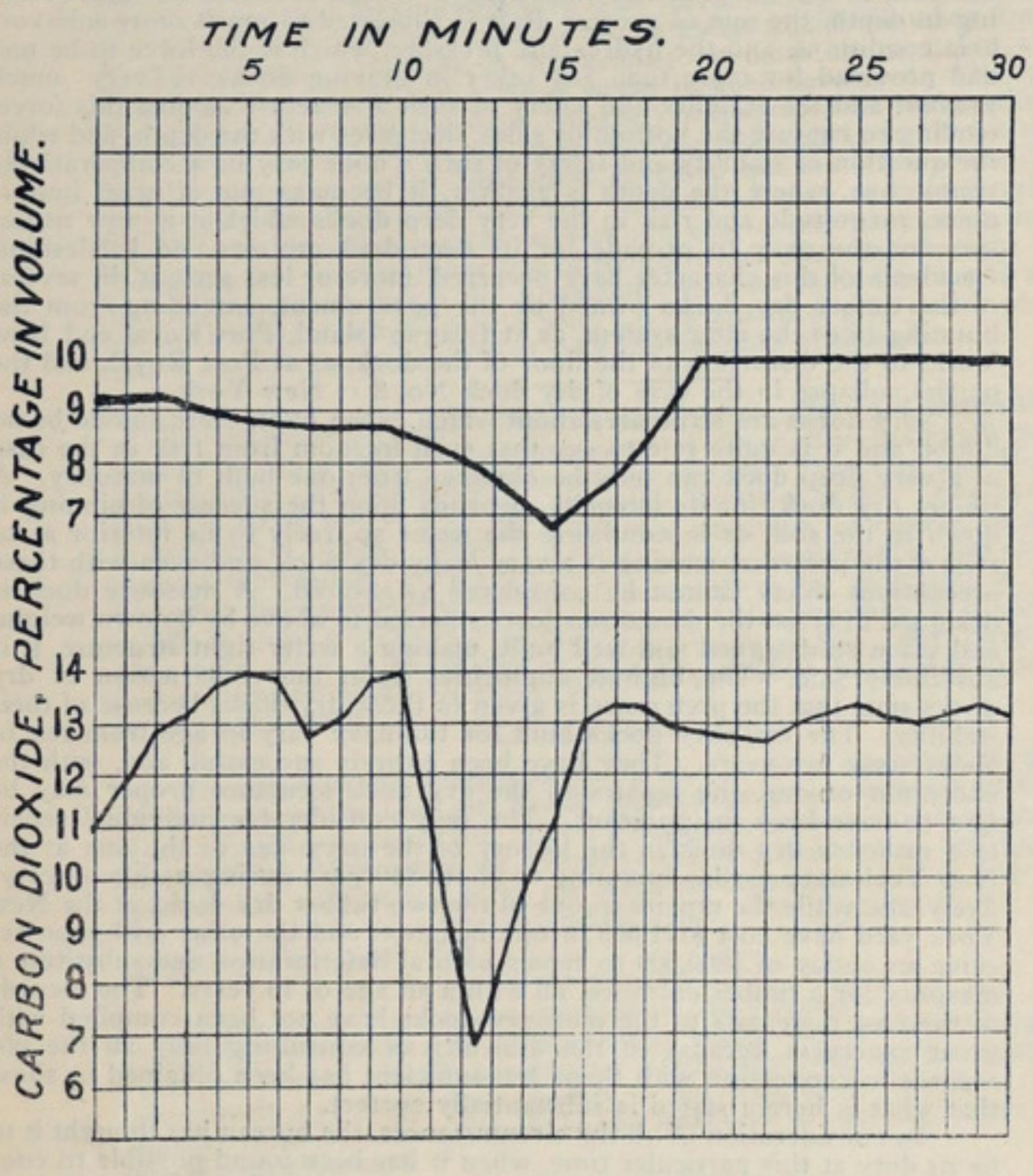
FORCED DRAFT.

OPINION OF AN EXPERT ON THE SUBJECT OF MAINTAINING PROPER COMBUSTION—RIGHTLY MANAGED, FORCED OR INDUCED DRAFT, IS WHAT IS WANTED ON LAKE STEAMERS.

Editor Marine Review:—In looking over my file of your journal an article entitled "Economizers in Belleville Boilers" in the issue of April 28, 1898, attracts my attention. Sir John Durston (engineer-in-chief of the British navy), I take it, considers that the use of economizers in connection with a jet of air introduced among the combustion gases is a cure for the formation of carbon monoxide. No doubt in a measure this is true, but I do not think that it is a proper remedy for the difficulty. It must be conceded that it is best to supply sufficient air to the fuel on the grates to maintain the combustion process in the furnace where it should take place. It is not advisable to in a measure turn the furnace into a gas producer, for the sake of burning C. O. at the top of the boiler, even if there is an economizer located so that it will be effected thereby. Even with the low draft power in marine service, where the natural draft of a short chimney is depended on, there is no excuse for incomplete combustion, if proper attention is given to the handling of the fires, which is a matter that presents no serious difficulty, in view of the fact that there are simple instruments suitable for use on shipboard, with which the combustion process may be readily determined. The products of the combustion of coal are as follows:

CO_2, Carbon dioxide,
H_2O, Water,
SO_2, Sulphurous acid, and
N, Nitrogen.

The latter, however, would be better called a result of combustion, as it is set free in the process. The above would be the result of a perfect performance, if just the required quantity of oxygen was supplied and



brought in relation with the carbon, hydrogen and sulphur; as, however, this perfection is unattainable, the result, when not enough air is supplied, is about as follows:

CO_2, Carbon dioxide.
CO, Carbon monoxide,
H_2O, Water;
CH_4, Marsh gas,
C_2H_4, Olefiant gas,
S, Sulphur
SO_2, Sulphurous acid,
N, Nitrogen,
Air. (In small volume.)

The CO, CH_4 C_2 H_4 and S. are combinations of carbon, hydrogen and sulphur which have not found their required quantity of oxygen. This conditon is representative of the performance when the air supply is deficient, and is that which often exists in marine boilers with very low draft power accompanied with unreasonable stoking, resulting in relatively thick fires, which in a measure turns the furnace into a gas producer. To show that this condition is wasteful, it is only necessary to call attention to the fact that one pound of carbon burned to CO_2 produces 14,650 B. T. U., but when burned to C O only 4,400 B. T. U. The resulting loss from failure to burn hydrogen is, of course, a factor; the carbon, however, is in much greater quantity and therefore of like importance.

The loss resulting from deficient air supply seldom exists where the draft power is good, as in stationary boiler furnaces, locomotives or marine boilers fitted with forced or induced draft. Under these conditions there is a loss from an opposite cause, that of an unwarranted excess of air, which often is more serious than many cases of insufficient supply. The compositon of the gases under excessive air supply may be represented by:

CO_2, Carbon dioxide,
H_2O, Water,
SO_2, Sulphurous acid,
N, Nitrogen, and
Air.

This would represent, as far as combustion is concerned, a perfect result. It must be stated, however, that with the marine boiler furnace, no matter how liberal the air supply may be, there will be present some unburned hydrocarbons, as shown by the color of the escaping gases, which is known as smoke, and there may be a trace of C.O. The loss under these conditions is caused by the necessary heating of the excess of air which is not used, and the direct loss is in proportion to the temperature at which the gases leave the boiler.

The coal in use on the lakes will probably average about 77 per cent carbon, and from 4 to 5 per cent hydrogen. The carbon here given is that of ultimate analysis, some of it being in combination with hydrogen. As the carbon unites with oxygen, forming carbon dioxide or CO_2, and the hydrogen also with oxygen, forming water or H_2O it is apparent that the amount of carbon dioxide in the gases is an index to the state of combustion, as it is by far the principal product of the combustion process. A favorable state of combustion should show 10 to 12 per cent CO_2 in the gases, although as much as 14 or 15 may sometimes be reached. There are two causes for the CO_2 being low in volume. One is that owing to lack of air CO is formed in considerable volume; the other is that there is such volume of air mixed with the gases that the relative volume of CO_2 is smaller in comparison. It therefore follows that a knowledge of the amount of CO_2 is an indication of the condition of combustion, and in this connection the accompanying diagram may be of interest, because it illustrates the unfavorable conditions which prevail in marine boiler furnaces. In length time by minutes is represented, in elevation percentage of carbon dioxide in volume is shown. The determinations were made with a simple instrument which I use for the purpose, and with which frequent analysis may be obtained. The upper curve is plotted from observations taken two and a half minutes apart. At the beginning the draft was partially cut off, so that the coal was not burned as fast as supplied. This resulted in the formation of some CO, which reduced the possible quantity of CO_2, and as the fire thickness increased the CO_2 became less, as shown by the curve up to the 15th minute. At this time the draft was increased, resulting in the production of less CO and more CO_2, which at the 20th minute reached 10 per cent, at which it continued.

The second is from observations taken each minute from a furnace with a very poor draft. At the beginning the curve is at 11 per cent, and shows some excess of air. The fire was increased in thickness, resulting in the reduction of the excess of air, and increase in CO_2 to 14 per cent, from which it soon dropped. With another coaling it again reached 14 at the 10th minute, when the air supply was so much overcome that the production of CO was of such amount and duration as shown by the great drop in the curve, which reaches below 7 per cent. After the recovery, owing to the fire burning down somewhat, the performance is more satisfactory, as shown.

The use of economizers in their legitimate sphere in connection with marine boilers is certainly to be commended, as the increased efficiency that may be obtained is greater than on land. An economizer is properly as much a feature of an efficient steam generator as the second or third cylinders of a compound or triple expansion engine is a part of the engine. The only difference in principle is that one is a method of utilizing steam temperatures, while the other uses temperatures of combustion gases, each at lower stages.

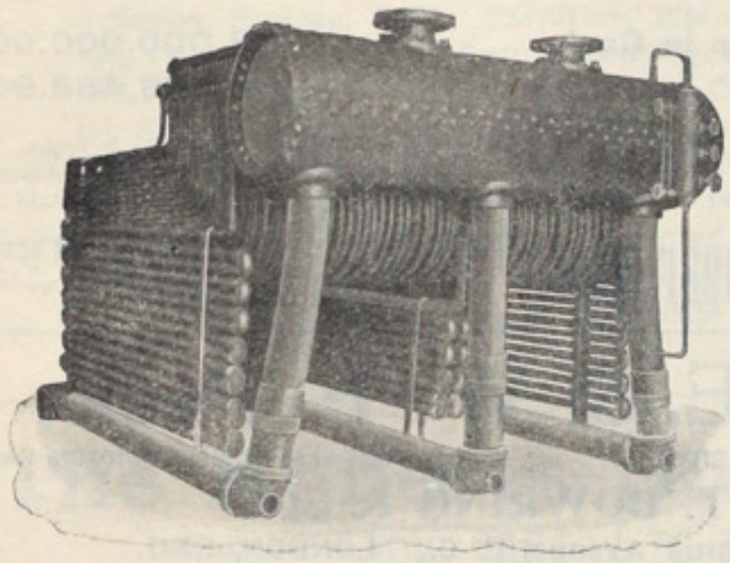
The temperature of the steam in a modern marine boiler is from 375 to over 400 degrees F., and it is impossible for the combustion gases to be reduced in temperature to less than 600 degrees when in contact with the boiler surface, but with an economizer in use the feed water may enter in many cases at as low as 115 to 130 degrees, and should result in increased efficiency of at least 15 per cent. The economizer is, however, a decided obstruction to draft, and could never be used with satisfaction except in connection with either forced or induced draft apparatus. The value of the economizer is so great that it is surprising that its consideration did not seriously come up in connection with its legitimate use, rather than as a cure for a trouble which has its own remedy. If ship owners who have not already done so will install forced draft they will have less trouble in maintaining proper combustion, if the operation of the apparatus is rightly managed. It is, indeed, surprising that there should be any steamers on the lakes unprovided with either forced or induced draft, in view of the remarkable records made. A. BEMENT.

Chicago, Ill., Feb. 15, 1899.

The Bertram Engine Works Co. of Toronto is about to put down the keel for a steel steamer similar to the steamer building at the works of the Craig Ship Building Co., Toledo, and similar also to the steamers Minneapolis, St. Paul and Huron of Cleveland, which are of a size suited to passage from the lakes to the Atlantic seaboard as soon as the canals of the St. Lawrence river are completed to 14 feet draft. Vessels of this type carry about 3,000 tons in lake service. Names of owners of the boat to be built at Toronto have not been given out as yet. It is thought that the boat building by the Craig company at Toledo has been sold or chartered for Atlantic coast service as the original plan of giving her an old set of lake engines has been changed, and she is to have new engines located amidships. The new engines—triple expansion with 22-inch high pressure cylinder—are to be built by S. F. Hodge & Co. of Detroit. The Craig company will launch this steamer shortly, and with the demand for new vessels now existing it is more than probable that they will put down a new keel at once.

BOYER WATER TUBE BOILER.

With the navies of the world turning almost entirely to water tube boilers of late, and with the engineer-in-chief of our own navy highly enthusiastic over this kind of steam generator as a result of war experiences, it is not surprising that ship owners everywhere are now thoroughly interested in the boiler. A selection from the many different boilers on the market—each possessing claims for special consideration—requires thorough investigation, a test by actual service for some length of time, being about the only way of determining which possesses most advantages. It is claimed for the Boyer water tube boiler that it is the result of many years' consideration and experiment by practical men, interested as steam vessel owners in obtaining a boiler that would give maximum results on minimum weight and low coal consumption.



John S. Loomis, owner of the steam yacht Marguerite, says of the Boyer boiler: "It is the best and most rapid steamer I ever saw. It produces steam economically, is easily fired, and its installation has increased the speed of the Marguerite a good two miles per hour. It has so many good points that I cannot do it justice on paper or express myself strongly enough in its praise."

The following is an extract from a report of a test made of a Boyer boiler installed in the steamer Clara by Capt. C. W. Woolsey, for six years superintendent of the Pennsylvania Co's ferry system and for fifteen years superintendent of the Hoboken Ferry Co.: "During the progress of the trip in the harbor, and being able to have the boat handled as would best serve the purpose of my test, I found it possible for the boat to lie still a period of seven minutes with her gauge showing no more than five pounds variation of pressure. Again, upon starting up the pressure was almost constant. I was pleased also to note that no extra precautions were taken to prevent the pressure rising when the boat was lying still, and that only the usual and customary opening of furnace doors was observed. During the part of the trip in which we had the wind free, the steaming was equally as good as when we were beating against a head wind. In former investigations I found that it has always been the custom when the boat stopped to immediately put on all the pumps as an additional means of keeping down the pressure. With the Boyer boiler this was not the case, and I failed to notice any appreciable lowering of the water level. I may add that I was particularly pleased with the mechanical attachments, all serving to insure the great amount of safety. The reducing valve from boiler to engine seems to work like a charm, while the safety valve of your main steam pipe suggests a degree of care and caution which I think could properly be emulated. Without being myself a practical engineer, I think I am justified in saying, from a practical experience in marine matters covering a great many years, and from the close observation that I have been able to give, that you have attained the nearest approach to perfection in water-tube boilers."

The steam yacht Rex, which, during 1893, made the trip to the Chicago Exposition via the Erie canal, has shown no ill effects whatever from the use of hard lake water during the season of 1893-94. Last summer, after ordering a few minor repairs to the boiler of the Rex (the first made in five years), the local inspectors at Bangor, Me., passed it for 225 pounds steam pressure.

The tug Peter S, which also has a Boyer boiler—installed in the winter of 1893-94—has required no repairs on its boiler up to the present time.

Capt. M. DePuy of 19 South street, New York, the well-known boiler manufacturer, and who is thoroughly conversant with existing conditions on the Erie canal, has addressed to Governor Roosevelt of New York an open letter citing instances of abuse to the Erie canal and the commerce of the port of New York and asserting that "immediate remedies are what is needed—not investigation."

CHICAGO TOOLS THROUGHOUT THE WORLD.

President J. W. Duntley of the Chicago Pneumatic Tool Co., has just arrived home from his sixth trip to Europe within three years, and after having made a two months' trip throughout Great Britain and the Continent, he reports from the London house of the company a very rapid extension in the demand for pneumatic tools, with enquiries showing that rapid extension is likely to increase very much. The London house of the Chicago company reports that they have now supplied complete plants in Belgium, France, Germany, Holland, Italy, Sweden, Russia, Egypt, Australia, India, Japan and South Africa.

"Prior to the introduction of the Boyer tools in Europe," says Mr. Duntley, "the use of pneumatic hammers had been greatly restricted, owing to the decided opposition of the workmen to handling the valveless tools, on account of the injurious vibration; but with the advent of the Boyer hammer, this objection has vanished and they are now coming into general use throughout Great Britain and Europe. Previous to the introduction of the Boyer piston air drills, rotary pneumatic drills had been used in Europe, but when the Boyer drills were shown, their very superior working qualities—amounting, in many cases, to double that of the rotary drills—and their economy in the use of compressed air, being only a fraction of that required by others, very quickly led to their general adoption. The superior work of the Boyer pneumatic riveters has also overcome the European prejudice against anything but hand riveting, and it is now generally acknowledged that the work is better and is obtained at a fraction of the cost of hand riveting."

In Glasgow, recently, Mr. Duntley made a trial exhibition of the Boyer riveters, hammers and drills before a general convention of ship builders, and these tools have now been adopted by all the ship yards on the Clyde. The high standard of excellence of the Boyer tools, with their very superior working qualities, freedom from vibration, and economy in the use of air, has won the same recognition of their merits in Europe that prevails in this country, and has led to their universal adoption. As proof that this claim for the superiority of the Chicago tools is not an idle one, reference is made to an article on "Good Workmanship" in London Engineering of Jan. 6, 1899. A representative of that high-class engineering journal took to pieces some of the Boyer tools, and in regard thereto he says: "The examination thus made showed this work to be, all things considered, one of the best examples of mechanical engineering we have ever met with."

From the home office of the Chicago company complete plants have been furnished to China, Japan, South Africa, South America, Central America, Mexico, Hawaiian islands, Canada, Alaska, and all parts of the United States, so that these tools are now in use throughout the entire civilized world.

Mr. Duntley reports business in Europe as in a generally prosperous condition, almost equal to the change found here upon his return.

The Bessemer Steamship Company

Solicits Catalogues, Prices and Discounts from manufacturers and wholesale dealers in Ship Machinery, Brass Goods, Rope, Paints, Asbestos, Packing, Hose, Furniture, Piping, Glass and Crockery, Tinware, Ranges, Carpeting, Bedding, Life-preservers, Rafts and Boats, Engineers' Supplies and Tools, Carpenters' Tools, Electric Supplies, Lamps, Grate Bars, Castings, etc., etc., etc.

ALSO QUOTATIONS from Market men and Grocers on the Lakes for Provisions and Meat, best quality only.

CATALOGUES without quotations are not wanted.

ALL GOODS except provisions to be delivered in Cleveland.

Address L. M. BOWERS, General Manager,
CLEVELAND, OHIO.

The Roberts Boiler Co.

Have built about 1000 BOILERS TO DATE for

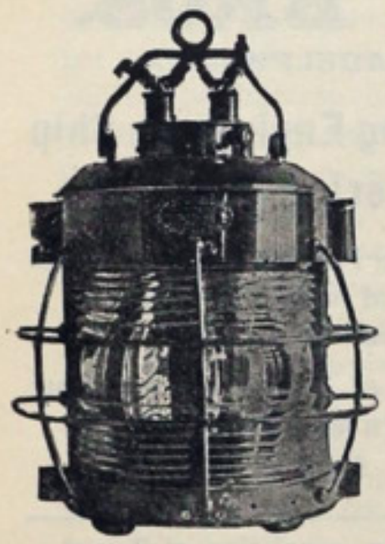
Launches, Yachts, Passenger and Freight Steamers, Dredges, Tugs, Stern-Wheelers, Canalers; also for Navy Department, War Department, Treasury Department, Light-House Board and Revenue Cutter Service; also for N. Y. Dock Department and U. S. Supervisor, Harbor of N. Y.

SAFETY AND ECONOMY.

Never killed a man or had a serious accident. $250,000 capital. Works covering 29,000 square feet of ground. Never had a boiler returned on account of dissatisfaction. Every Boiler Warranted. All material made specially for our use. All boilers tested at 500 pounds hydrostatic pressure and 250 pounds of steam before shipping. Workmanship strictly first-class. All joints screwed and reliable. No expanded joints. State your requirements and we will furnish specifications. Correspondence solicited.

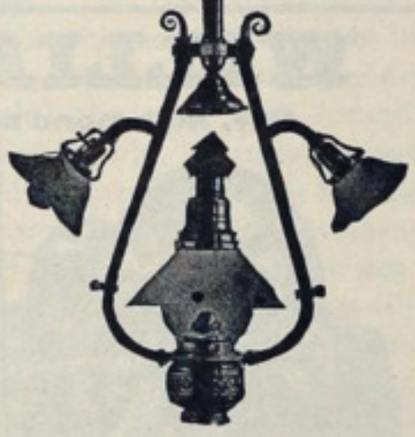
THE ROBERTS SAFETY WATER TUBE BOILER CO.,
39 and 41 Cortlandt Street, New York City.
Works, Red Bank, N. J.

MARINE LAMPS



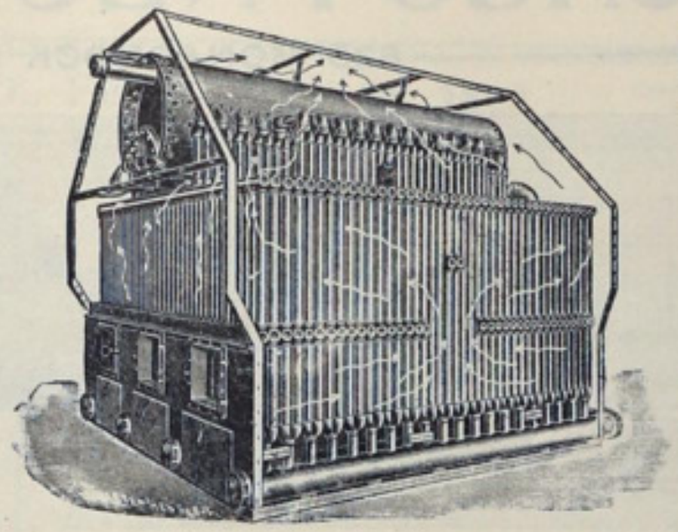
Oil and Electric Equipment for Steamships, Yachts, etc.

Signal Lights, Saloon Fixtures, Cabin Lamps, Lanterns, etc.



Wm. Porter's Sons,
271 Pearl St., NEW YORK CITY.

THE "TAYLOR" YACHT BOILER



Has held the record three seasons on the fastest yacht on the great lakes.

Guaranteed against Rupture of Tubes.

Will not Prime in the Roughest Sea.

MANUFACTURED BY
Detroit Screw Works,
FOOT OF REOPELLE ST.,
DETROIT, MICH., U. S. A.

THOS. DREIN & SON, TATNALL AND RAILROAD STS., WILMINGTON, DEL.

Builders of Metallic Life Boats and Rafts, Yachts and Pleasure Boats, Life Preservers. Outfit for Lake Steamers a Specialty

M. W. Fogg.

MANUFACTURER OF
HAIR AND FELT
MATTRESSES, CUSHIONS
AND BEDDING.

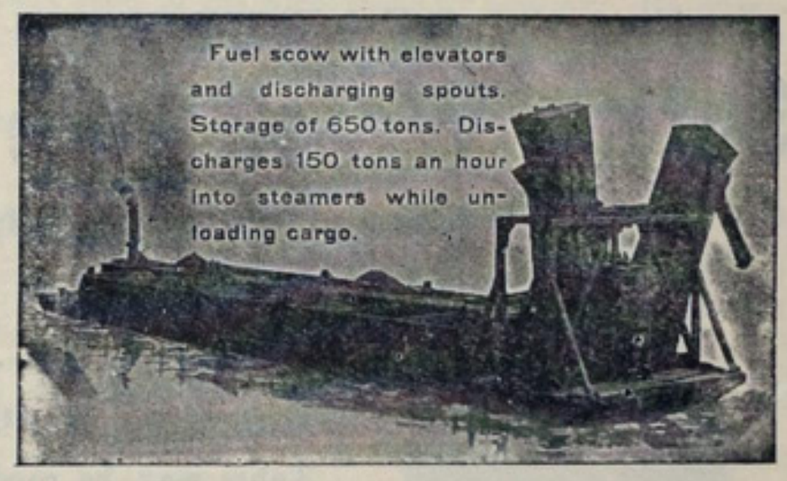
18 Fulton St., Cor. Front,
NEW YORK CITY, U. S. A.

Steamboat Fuel at Ashtabula,

LARGE SUPPLIES OF BEST QUALITY.

Lighter

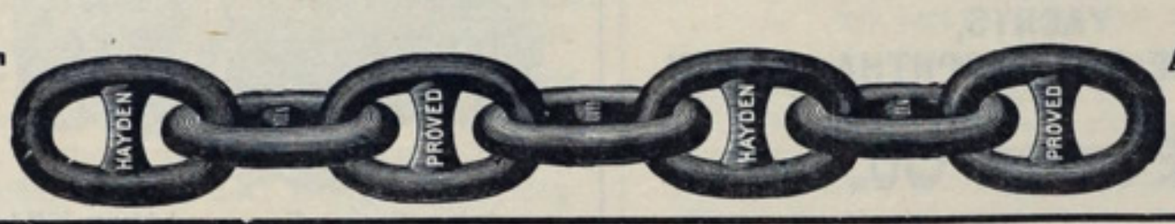
Carrying Different Grades at all Times.



M. A. HANNA & CO., Miners and Shippers.
Main Office, Perry-Payne Bldg., Cleveland.

Chain Department ✻ P. HAYDEN S. H. CO. ✻ Columbus, Ohio.

Our Chain in use on the Largest Steamers on the Lakes:
The Zenith City, Victory, North West and North Land, and many others.



All kinds of Chain—
Stud and Close Link,
Cable Chains.
Write for Prices.

Steamboat Fuel at Chicago.

THE Y&L

Youghiogheny and Lehigh Coal Co.

J. T. CONNERY, Manager. ARCHIE J. HITCHCOCK, Dock Sup't.

FUEL DOCKS: No. 1, Michigan Slip and Basin. 'Phone 3046, Main.
No. 2, N. Halsted St. Bridge. 'Phone 773 North.

FUEL LIGHTER: Equipped with 125 2-ton Buckets for Fueling Anywhere in Harbor.

MAIN OFFICE: 1238-1242 Chicago Stock Exchange Building.

Long Distance Telephone, Main 5049. 110 LA SALLE STREET.

Steamboat Fuel at Cleveland.

THE P&C

The Pittsburgh & Chicago Gas Coal Co.

J. A. DONALDSON, Manager. N. J. BOYLAN, Fuel Manager.

FUEL DOCKS: No. 1, River Bed, through Valley R. R. Bridge.
No. 2, Main River, just north of Main St. Bridge.
'PHONE, WEST 190.

FUEL LIGHTER: 300 Tons Capacity; Fuel Anywhere in the Harbor.

OFFICE: 420 AND 421 PERRY-PAYNE BUILDING.

TELEPHONE, MAIN 1888.

WE PRODUCE OUR YOUGHIOGHENY COAL, AND GUARANTEE QUALITY.